THE ROYAL ASTRONOMICAL SOCIETY OF LONDON.

THIS society, the most important astronomical organization in existence holding frequent meetings, had its anniversary session on Feb. 13, on which occasion the principal event was the presentation of the gold medal to Dr. William Huggins for his spectroscopic researches, as already announced. The 'Monthly notice' which gives account of this meeting is usually the most interesting number for the year, and the present issue is not disappointing in this regard. The society, which was organized about the year 1820, is possessed of a good degree of wealth, aggregating considerably more than a hundred thousand dollars, of which about seventy thousand are pecuniarily remunerative. Not a small amount of the society's property is in the shape of astronomical and other instruments of precision, a catalogue of which is regularly published, and embraces this year a list of a hundred and twenty-one entries. The publications of the society have now reached the forty-fifth volume of 'Monthly notices,' and of the 'Memoirs' the forty-eighth. The second part of this latter volume is now in press, and is announced to contain Mr. Seabroke's fourth catalogue of micrometric measures of double stars, Professor Pritchard's determination of the relative proper motion of forty stars in the Pleiades, Mr. Knobel's observations of Mars in 1884, and two memoirs relative to the moon, — the one by Mr. Neison on the corrections required by Hansen's 'Tables,' and the other by Gogou on an inequality of long-period in its motion.

The council of the society record the loss by death, during the year, of fifteen fellows and one associate: an exceptional number of these are men of wide reputation, and the obituary records are exceptionally well written. We note only Henry George Bohn, John Henry Dallmeyer, Isaac Todhunter, Francis Diedrich Wackerbarth, Ernst Friedrich Wilhelm Klinkerfues, Marian Kowalski, and Johann Friedrich Julius Schmidt. In general, the 'Proceedings of observatories' are not more interesting than formerly; and, of the twenty-one institutions reported, a small number appear to be gradually fossilizing, while at two or three an extraordinary degree of activity is evinced. American astronomers will find slender cause for complaining at the council's "Notes on some points connected with the progress of astronomy during the past year;" for about one-half of the section of twenty-seven pages devoted to this history is occupied with the work of Americans in the advancement of this science. The important 'points' commented upon are Professor Newcomb's researches in mathematical astronomy, Professor Safford's investigation of Greenwich planetary observations, star catalogues by Dr. Gould and Dr. Grant, Dr. Backlund's investigation of the motion of Encke's comet, Dembowski's measures of double stars, Professor Pickering's work with the meridian photometer, Dr. Huggins's photography of the solar corona without an eclipse, Professor Langley's researches in atmospheric absorption, and the conclusions of the International prime-meridian conference.

At the conclusion of the anniversary meeting, Mr. Edwin Dunkin was re-elected president of the society; and Professor Adams, Professor Cayley, Dr. De la Rue, and Mr. Stone were elected vice-presidents.

JAMES CLERK MAXWELL.

THIS abridged volume will be welcomed with great pleasure by all who have enjoyed the larger work, for it puts into one's hands a *vade mecum*. The life of Maxwell is worth pondering upon; and it is a peculiarity of all that he has ever written upon science, that some minds can draw inexhaustible nourishment from his essays and letters. Many will miss portions of the larger volume; but, in return for what has been omitted, the editors have given three important letters from Clerk Maxwell to Faraday, and one of Faraday's to him. The volume also contains letters to Dr. Huggins on the structure of comets. His letter to Faraday, upon the latter's idea of lines of force, shows clearly how strongly the new conception had taken possession of his mind. In this letter he says, —

> "You have also seen that the great mystery is, not how like bodies repel and unlike attract, but how like bodies attract by gravitation. But if you can get over that difficulty, either by making gravity the residual of the two electricities or by simply admitting it, then your lines of force can 'weave a web across the sky,' and lead the stars in their courses, without any necessarily immediate connection with the objects of their attraction."

It is highly interesting to read the letters which passed between these distinguished men. It was perfectly natural for Maxwell to express his physical ideas in mathematical language; while Faraday, unversed in mathematics, could nevertheless express his conclusions in a logical shape, which were the translations into ordinary language of the results of Maxwell's equations. In one place Faraday writes, —

> "There is one thing I would be glad to ask you. When a mathematician, engaged in investigating physical actions and results, has arrived at his conclusions, may they not be expressed in common language as fully, clearly, and definitely as in mathematical formulae? If so, would it not be a great boon to such as I, to express them so, translating them out of their hieroglyphics, that we also might work upon them by experiment?"

The life of James Clerk Maxwell; with selections from his correspondence and occasional writings. By LEWIS CAMPBELL, M.A., LL.D., and WILLIAM GARNETT, M.A. New edition, abridged and revised. London, *Macmillan*, 1884. 16+421 p. 8°.

In these days of renewed interest in the establishment of physical laboratories, it is interesting to read Maxwell's views of the best method of conducting these laboratories. In a letter to Mrs. Maxwell, he says in regard to the Cavendish laboratory at Cambridge, —

"There are two parties about the professorship: one wants popular lectures, and the other cares more for experimental work. I think there should be a gradation, — popular lectures and rough experiments for the masses, real experiments for real students, and laborious experiments for first-rate men."

Rarely has the true solution of the problem of the proper course in the direction of a laboratory been more clearly stated.

Many who know nothing of the nature of the studies to which Maxwell devoted his life, will read his life, and find it a fascinating one. The philosopher will ponder over the views of the structure of the universe, and Maxwell's endeavor to do his duty in a world some of whose mysteries he set himself to discover. The physicist will find it easier to read the treatise on heat, and the treatise on electricity and magnetism, by becoming better acquainted with the habits of thought of Maxwell as they are revealed by his own letters in this little volume. The devout Christian will find in Maxwell an exemplar to whom he can point with unanswerable words as an illustration of the satisfying power of the Christian faith to a mind which has had few equals in the history of the world, and which, nevertheless, clung to the Christian religion as the only satisfying thing in the end.

THE PART PLAYED BY THE CELL IN LIVING ORGANISMS.

LIKE most other new doctrines, the cellular theory has been given too wide an interpretation. Within the last few years, botanical research has proved that the essential living part, the protoplasm, is often united by slender threads passing from cell to cell. A similar connection has also been demonstrated in certain animal organs. Nevertheless, 'cells' remain actual facts, and very important facts, of which the biologist has to take account. The cellular theory may be modified in detail, but it will remain true in essentials. With regard to certain cells, even in the highest animals, as the amoeba-like corpuscles which creep all over our own bodies in the lymph-channels, and play an important part in the regeneration of injured tissues, it is certainly true, even in its most extreme form. At this critical epoch in its history, a brief account of the development of the cell-doctrine may be of interest. We condense it from the pages of Canon Carnoy.

La biologie cellulaire: étude comparée de la cellule dans les deux regnes. Par le Chanoine J. B. CARNOY, professeur à l'université catholique de Louvain. Lierre, *Joseph Van In et cie.*

Robert Hooke (1665) first applied the word 'cell' in describing the structure of plants. He did not, however, regard cells as separate pieces of living matter, but compared them to cavities in a continuous mass, like the cells of a honeycomb. Malpighi (1675) recognized that vegetable cells were distinct, apposed, closed sacs. Leeuwenhoek, in his letters to the Royal society of London (1680–95), called especial attention to the cell-membrane or envelope. From this time, for about one hundred years, vegetable cells (animal being unknown) were regarded as little bladders filled with a homogeneous liquid.

The next advance was made in 1781, when Fontana described and figured within some cells an 'oviform body provided in the centre with a spot.' This earliest observation of the cell-nucleus remained practically unheeded for fifty years, and then R. Brown of Oxford confirmed and greatly extended it. He first demonstrated that the nucleus was a normal and usual constituent of vegetable cells. The 'spot' inside the nucleus seen by Fontana, and now known as the *nucleolus*, was rediscovered by Valentin in 1836. At this epoch, therefore, the *cell* was defined as "a vesicle with a solid envelope, containing liquid in which a nucleus with its nucleolus floated." Starch grains, chlorophyl bodies, and crystals had also been seen in various cells.

The next step forward was the recognition of cells as independent individuals, or 'elementary organisms.' Turpin and Mirbel promulgated this view about 1826; but it was Schleiden's 'Grundzüge der wissenschaftlichen botanik' (1842) that led to any general acceptance of it by scientific men. Since then, Schwann, Max Schultze, Brücke, and many others, have firmly established it.

Meanwhile, the relation of cells to the large plants in which they were found, was being studied. Malpighi and Leeuwenhoek both believed that such plants were essentially made up of juxtaposed cells. Schleiden and others, especially Hugo von Mohl (1827), finally demonstrated that vegetable tissues, as a whole, were but aggregates of more or less modified cells, which had a common origin, and were all at first alike, but often became greatly altered in the growth and development of the plant.